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SOUTHERN FOREST EXPERIMENT STATION

E. L. Demmon, Director

New Orleans, La.

IMPROVEMENT CUTTINGS IN SHORTLEAF AND LOBLOLLY PINE

by

R. R. Reynolds, Associate Forest Economist,
Southern Forest Experiment Station

The Occasional Papers of the Southern Forest Experiment Station present information on current southern forestry problems under investigation at the Station. In some cases these contributions were first presented as addresses to a limited group of people, and as "occasional papers" they can reach a much wider audience. In other cases, they are summaries of investigations prepared especially to give a report of the progress made in a particular field of research. In any case, the statements herein contained should be considered subject to correction or modification as further data are obtained.

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UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
SOUTHERN FOREST EXPERIMENT STATION

ADDRESS REPLY TO
DIRECTOR
AND REFER TO

MASONIC TEMPLE
333 ST. CHARLES ST.
NEW ORLEANS, LA.

R - SS
Reports
Occasional Paper No. 81

March 10, 1939.

Dear Sir:

Most timber stands in the South contain many low-quality trees of commercially valuable species and also varying numbers of unmerchantable or "weed" trees, that interfere with the establishment of the more valuable ones. The possibility of utilizing profitably these low-quality trees, therefore, will interest anyone who wishes to grow timber as a crop.

The attached progress report gives the results of relatively large-scale stand-improvement studies that have been under way at the Crossett (Arkansas) Experimental Forest during the past few years.

Very truly yours,

E. L. Demmon.
E. L. DEMMON,
Director.

Enclosure

IMPROVEMENT CUTTINGS IN SHORTLEAF AND LOBLOLLY PINE[1/]

by R. R. Reynolds,
Associate Forest Economist,
Southern Forest Experiment Station

It is not unusual to see identical twin boys or girls, but have you ever seen identical twin trees: two that are growing at the same rate, have the same size and length of crown, contain the same volume, have the same number of limbs of the same size and kind, and possess knots of the same size in identically the same places? Furthermore, have you ever seen two lumber or pulp-mill operations that were identical: two that cut the same kind and size of trees, use the same logging equipment, have the same woods and mill production costs, manufacture the same products in the same manner, and follow the same utilization practice?

I have never seen two identical trees. Neither have I seen two identical mills. Because of this wide variation in tree form and because of the great number of controlling physical and economic factors, the practice of forestry will always remain at least 50 percent art and not over 50 percent science. It is also because of this difference in trees, timberland owners, sawmills, and utilization practices that I can give you no last and final word on stand-improvement cutting methods and practices. The practice that will work well on one acre, or on one section, of one company's holdings may not work at all in another locality. I am firmly convinced that in each case details regarding cutting have to be worked out on the ground. But I can and will tell you the reasons I think improvement cuttings are desirable, how they best can be made, and the results that we have obtained from such cuttings.

During the past several years at Crossett, Ark., the Southern Forest Experiment Station has been working on selective-logging studies, pulpwood production-cost studies, and improvement-cutting studies, all in second-growth timber. Based upon the general results of these studies, I am of the firm opinion that timber growing in the future holds as much, or more, promise of profit as did the purchase and sawmilling of virgin timber in the past. But one of the first measures required of forest owners who wish a good net income from their forest holdings, is to get the "weeds" out of their crop. All stands of timber, regardless of whether virgin, old-field, or second-growth, contain a certain number of "weed" trees that should be removed in order to make room for good crop trees. In many stands, 25 to 75 percent of the ground area is occupied by such trees. I am sure most owners do not realize that in the shortleaf-loblolly pine type a stand, or growing stock, equivalent to about 1,100 board feet per acre is necessary to produce sufficient growth to pay expenses. Therefore, if a timberland owner has 100,000 acres of timber that contains a large proportion of "weed trees," with a growing stock of only 1,100 feet of merchantable timber per acre, his only compensation is the fun of handling this property without paying anything for his pleasure. If, however, he disposes of the worthless and low value trees and builds up the growing stock, for example, to 5,000 board feet of high-quality trees per acre, then he may have to worry about spending an annual income of $150,000 per year. There is no magic needed to make money in timber growing. In fact, it needs nothing more than a bit of good, uncommon sense along with a little capital.

1/ Presented before the Gulf States Section of the Society of American Foresters meeting in New Orleans, La., Nov. 5, 1937.

The success in improving stands by cutting depends upon the knowledge and skill of the owner, or manager, in determining which trees to cut and which to reserve for future growth. It must be realized, of course, that no hard and fast rules for marking can be set up, and that on a particular property the decisions as to which trees to cut must be made on the ground. A good rule to follow, unless economic necessity requires a heavier cut, is to mark only those trees that either are "financially mature" or are interfering with the growth and development of more valuable individual trees. Many people think that financially mature trees are only large mature ones, but in reality, <u>financially</u> mature trees may be of nearly any size and age—from 2 to 40 inches in diameter and from 10 to 300 years of age. A financially mature tree is one that because of location (perhaps under a large overtopping tree), or because of rot, crook, limbiness, or age, is either decreasing in value each year, or is not growing in volume or quality at a rate sufficient to produce a net return above the yearly cost of carrying this tree in the stand. We may list among these financially mature trees:

1. Badly suppressed trees, which are certain to go out of the stand within the next 5 years through natural mortality.

2. Trees that because of the crooked condition of the bole, will never produce saw timber. Fast-growing, crooked trees that contain, or will contain, pulpwood, should be left for additional growth if they do not interfere with the development of more valuable trees.

3. Trees that show unmistakable evidence of red-heart or other tree-destroying fungi.

4. Trees that contain fire scars or other injuries sufficiently severe to make them susceptible to wind damage.

5. Extremely brushy or limby trees that will never produce lumber of average quality better than grade #2C, and that will become less valuable for pulpwood or cordwood as more limbs develop.

6. Limby trees that will never produce at least one #2 sawlog should be removed if they interfere with more valuable trees.

After determining which trees are "weeds," the next problem is to get rid of them. Should we attempt to girdle them all, cut all of them for pulpwood and fuel wood, or cut only those that will "pay their way" and leave or girdle the others? With new markets developing, e.g., for pulpwood, a "high, wide, and handsome" girdling operation can hardly be recommended. On the other hand, cutting of pulpwood or fuel wood at a loss cannot be justified. Every effort should be made to find profitable markets for pulpwood, fuel wood, chemical wood, ties, posts, bolts for box boards and handle stock, or for any other of a possible 100 products; and then only those trees should be cut that will yield a profit.

We have made large-scale improvement-cutting studies on the Crossett Experimental Forest in the shortleaf—loblolly pine type to determine if such improvement cuttings can be made without cost. We have kept accurate cost records of the cutting on about 400 acres of second-growth timberland and also on enough trees of the various species to determine what type of tree cannot be cut at a profit into any salable product. We first cut the pines on the various areas and determined the cost and profit, and then from the same areas cut the hardwoods.

The defective or low-quality pine was cut into pulpwood at the following cost per 144 cubic feet:

Marking cost, including paint, etc.	$.035
Oil, wedges, saws, saw-filing, etc.	.115
Labor	1.030
Total	$1.180

The value in the woods on part of the wood produced on this cutting was $1.50 per 144 cubic feet, and on this unit we made a net profit of $.32. When the study was about half completed, the value of the wood increased to $2.00 per unit f.o.b. the woods; therefore, on about half the material we made a net profit of $.82 per unit. We obtained an average of 1.35 units of pulpwood per acre from this cutting, or a net income of $1.11 per acre with pulpwood at $2.00 per unit. It's not bad to have someone pay you for letting him pull the weeds out of your corn patch, is it?

After cutting the low-grade pine from the area we made an improvement cutting of the hardwood portion of the stand and sold the material for chemical wood. The cost of this cutting per 138 cubic feet was as follows:

Marking cost, including paint, etc.	$.035
Oil, wedges, saws, saw-filing, etc.	.115
Labor	1.590
Total	$1.740

The value in the woods of most of the chemical wood we have produced has been $2.00 per 138 cubic feet; therefore, our profit on this unit has been $.26. Of course we were fortunate in having a chemical-wood market that others might not have. Other markets, however, were available for this material; in fact, we developed a wood market that became so good that we could not fill the demand. A market is also available for low-grade hardwood logs to be cut into ties, timbers, and lumber. We thus had several chances to sell most of this low-grade material. As mentioned before, we made a study of the cost of production for all sizes and classes of trees, and as soon as we had determined definitely that we were losing more money on certain trees than it cost to girdle them, we quit cutting them.

Except for the large and extremely rough trees with large branches clear to the ground, from some of which it was practically impossible to split the bolts, we made a profit on all pines 4 inches d.b.h. and larger that had at least two sticks of pulpwood. In the hardwood portion of the stand, however, we had no market for red and black gum of low quality. We also lost money on large and very rough oak of several species and on most of the large hickory. Furthermore, it was generally not profitable to cut hardwoods below 7 inches d.b.h. into either chemical wood or fuel wood. On the remainder of the hardwoods we made a reasonable profit.

What disposal can be made of the red and black gum and the extremely rough and limby pines and hardwoods remains a problem. Since a market for both red and black gum for pulpwood, posts, and piling promises to develop in the near future, it seems desirable to save these trees until the market develops or until we are sure that a market will not be available. If we save the gums, we then have per acre only about 2 financially mature trees out of the 10 to 20 with which we started. It is often suggested that timberland is cheap and that instead of

girdling large wolf trees we should let them stand and buy more land. In some cases this may be a good practice, but each "wolf" tree may occupy one-tenth of an acre of ground, and girdling usually costs less than 5 cents a tree. If an acre were fully occupied with such trees, it would thus cost a maximum of 50 cents an acre to girdle. Where can other land be bought for 50 cents an acre?

It is not always necessary or advisable to carry on the improvement cutting entirely separate from other types of cutting. If this work is to be done under contract, it is much simpler to have it follow immediately a sawlog or other cutting and to have both operations done by the same contractor. By handling both cuts, the contractor not only can add a few butt logs from the cull trees to his sawlog operation, but he also can add the topwood from sawtimber trees to the pulpwood, chemical wood, or other products removed during the improvement cutting.

In conclusion, it may be stated that our studies of improvement cuttings in both pines and hardwoods indicate that such cuts are immediately profitable, and furthermore that they leave the stands in such a condition that they will later produce a greater volume of a higher quality and value. Our results also have been substantiated by several large companies that have followed similar practices in strictly commercial operations on very large areas.

Note: Assistance in the preparation of these materials was furnished by the personnel of Works Progress Administration Official Projects 701-3-9 and 365-64-3-7.